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(54) Shoehorn-type element for incorporation within footwear

(57) Footwear (2) is provided with a depressable heel grip (5) secured to an upwardly inclined rearward portion of a resiliently deformable frame (1). A forward portion of the frame is attached to or incorporated in the structure of the footwear. Preferably, the frame is of generally U-shape with the free ends of the limbs thereof constituting the forward position.

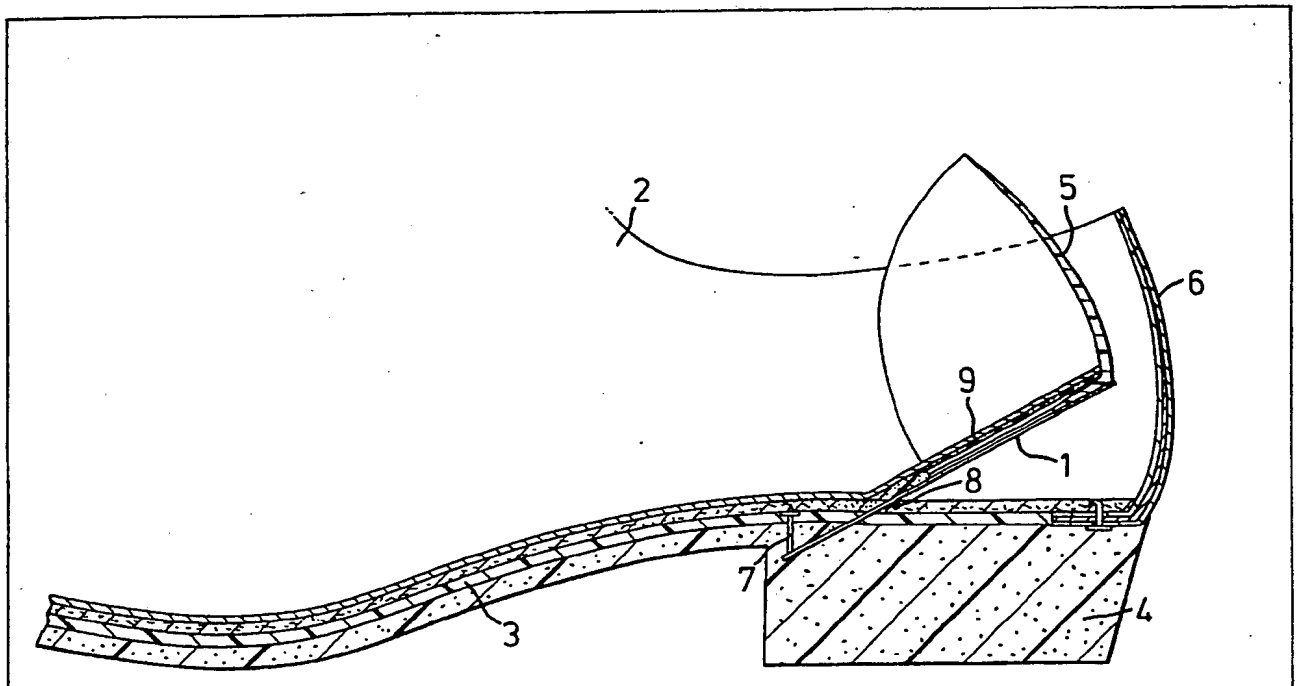

FIG. 1

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ERRATA

SPECIFICATION NO 2090723A

Front page
heading (71) Applicants
below London, N19 5EF. (second occurrence)
insert Lucy Ann Boutaleb,
24a Warrender Road,
London, N19 5EF.

heading (72) Inventors
below Boutaleb
insert Lucy Ann Boutaleb

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1st September 1982

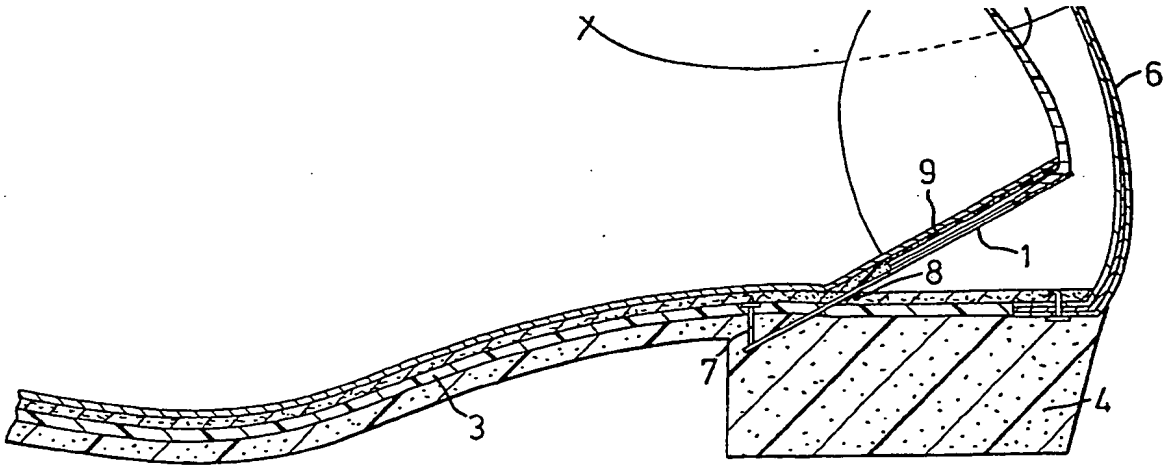

FIG. 1

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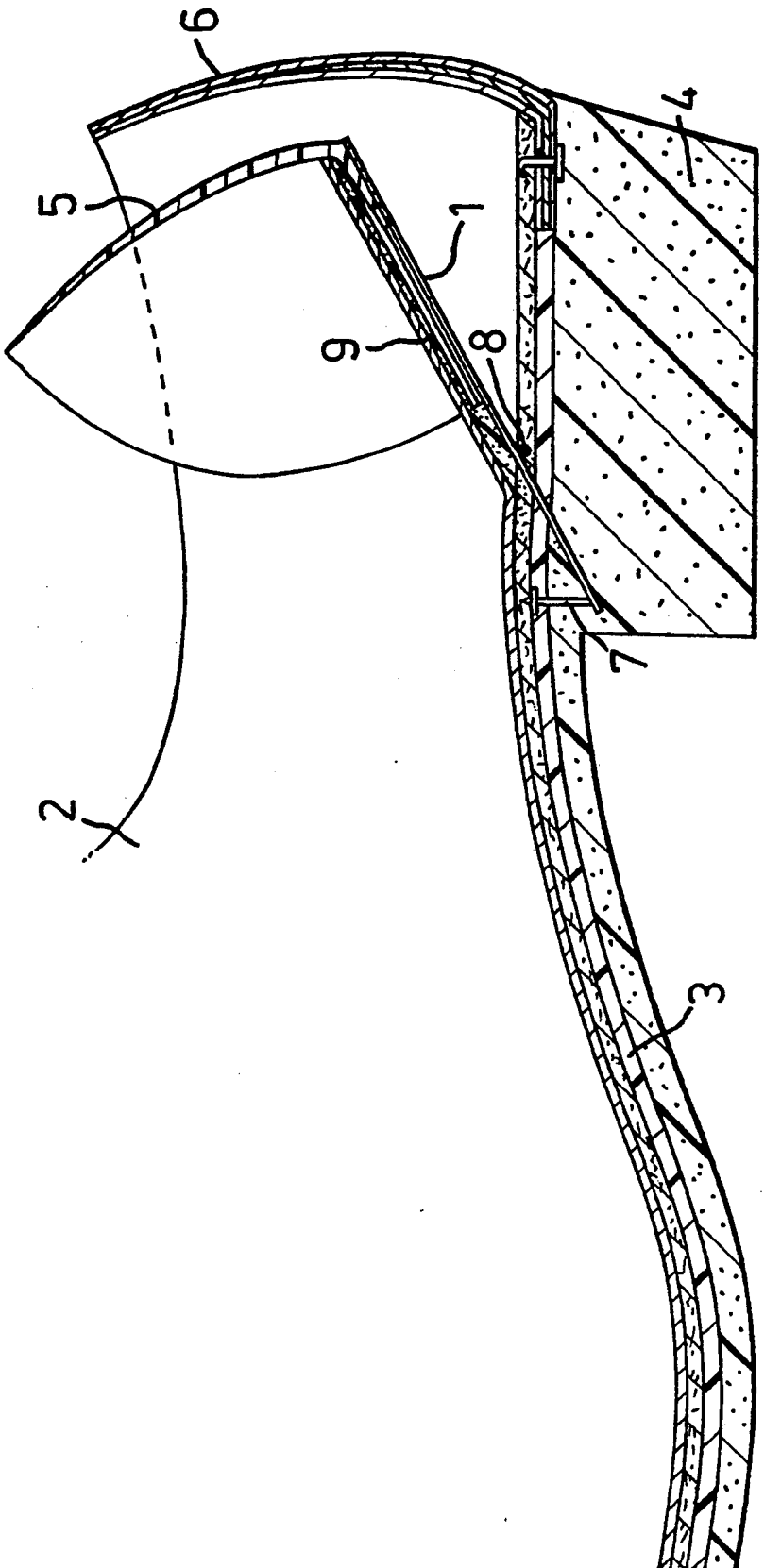

FIG. 1

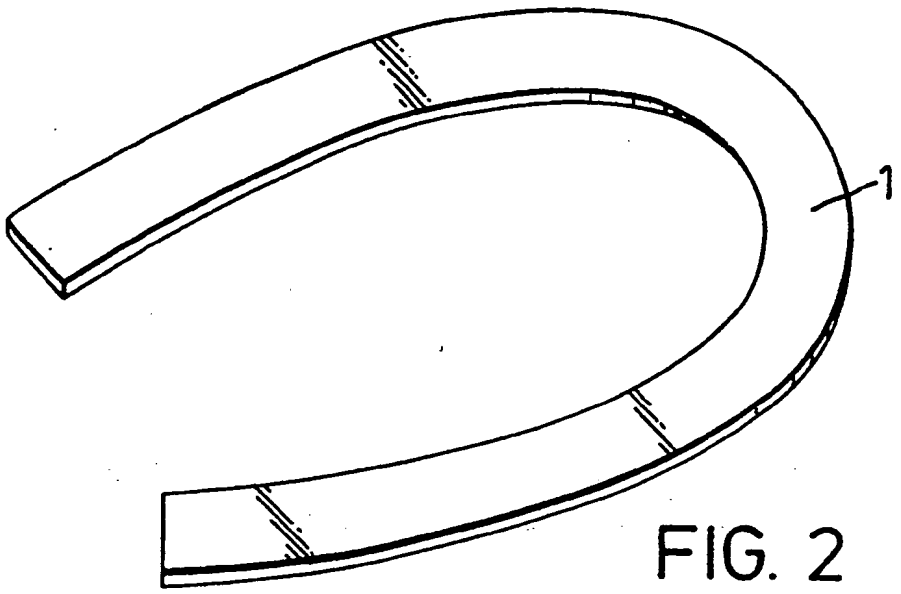

FIG. 2

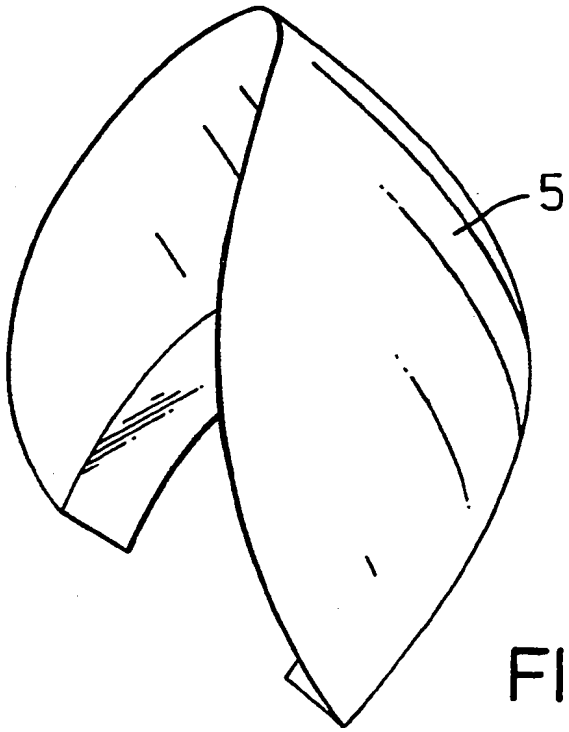

FIG. 3

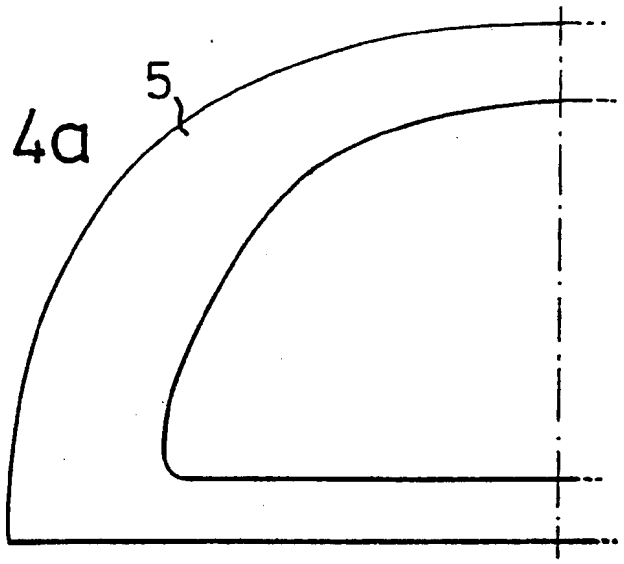

FIG. 4a

FIG. 4c

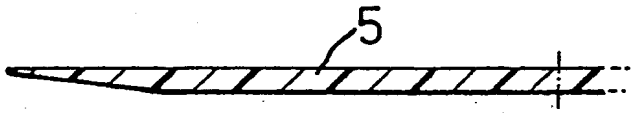

FIG. 4b

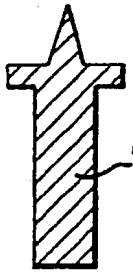

FIG. 5a

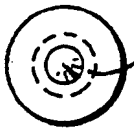

FIG. 5b

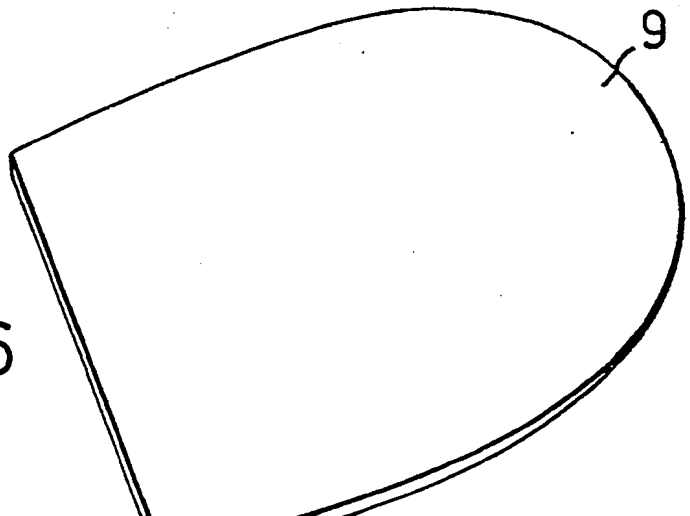

FIG. 6

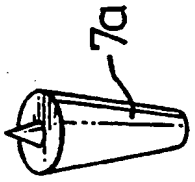

FIG. 8

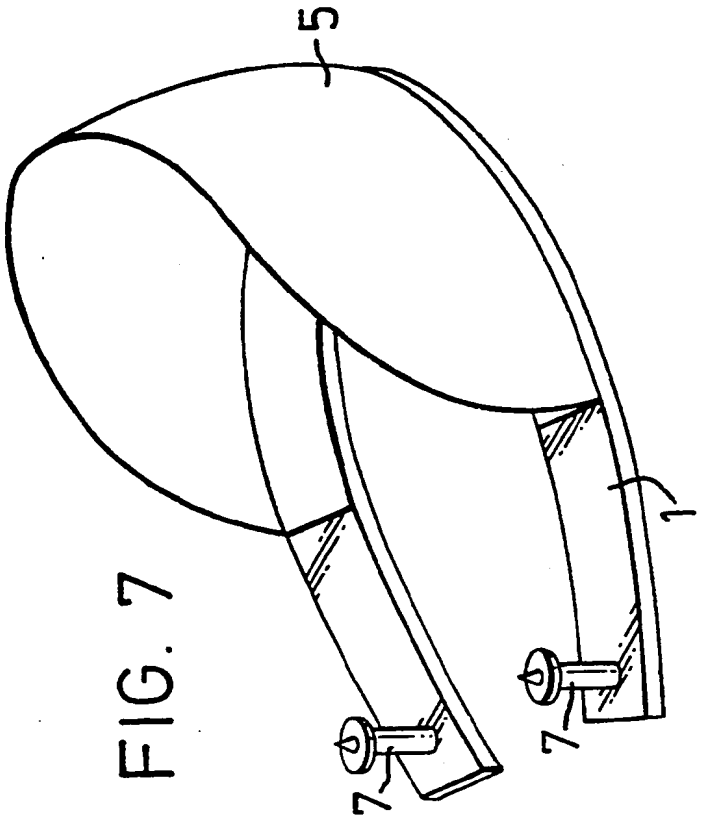

FIG. 7

FIG. 13

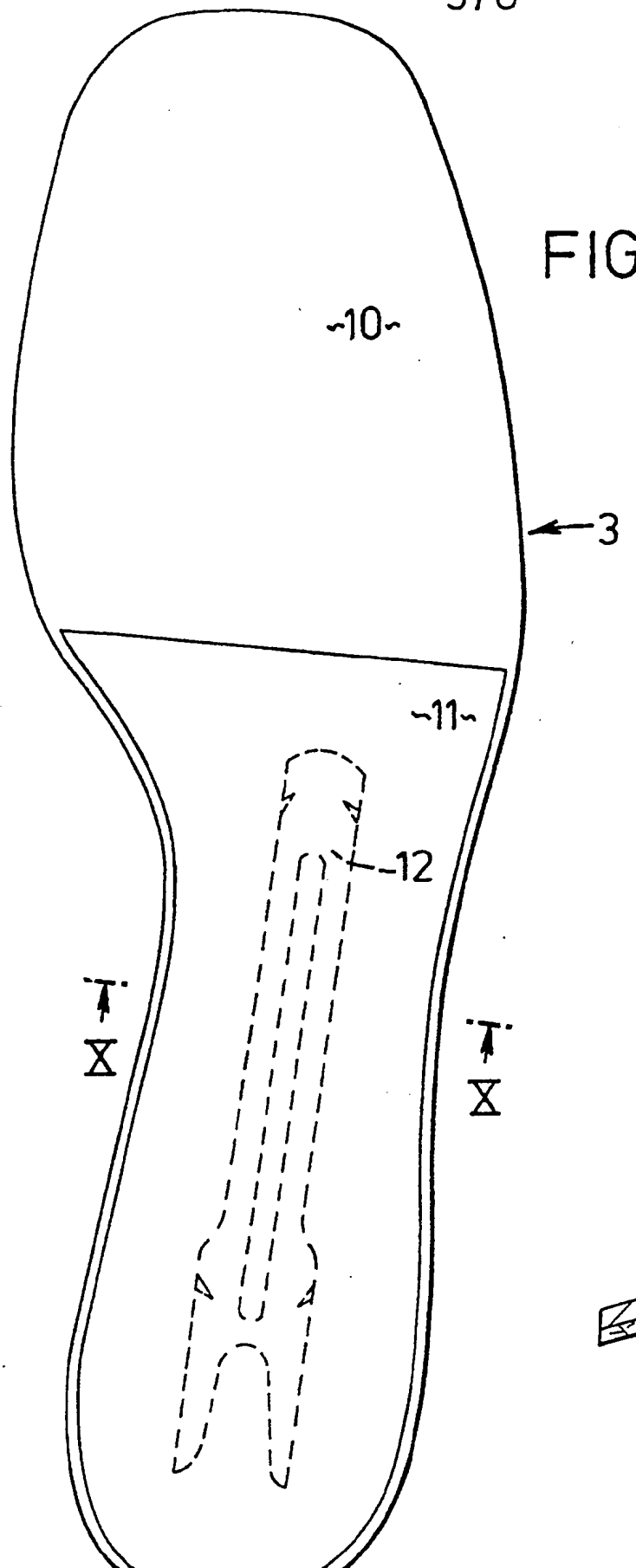

FIG. 9

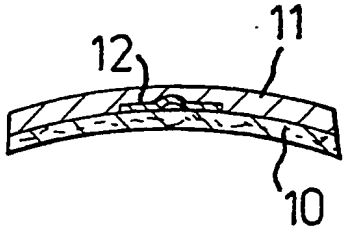

FIG. 10

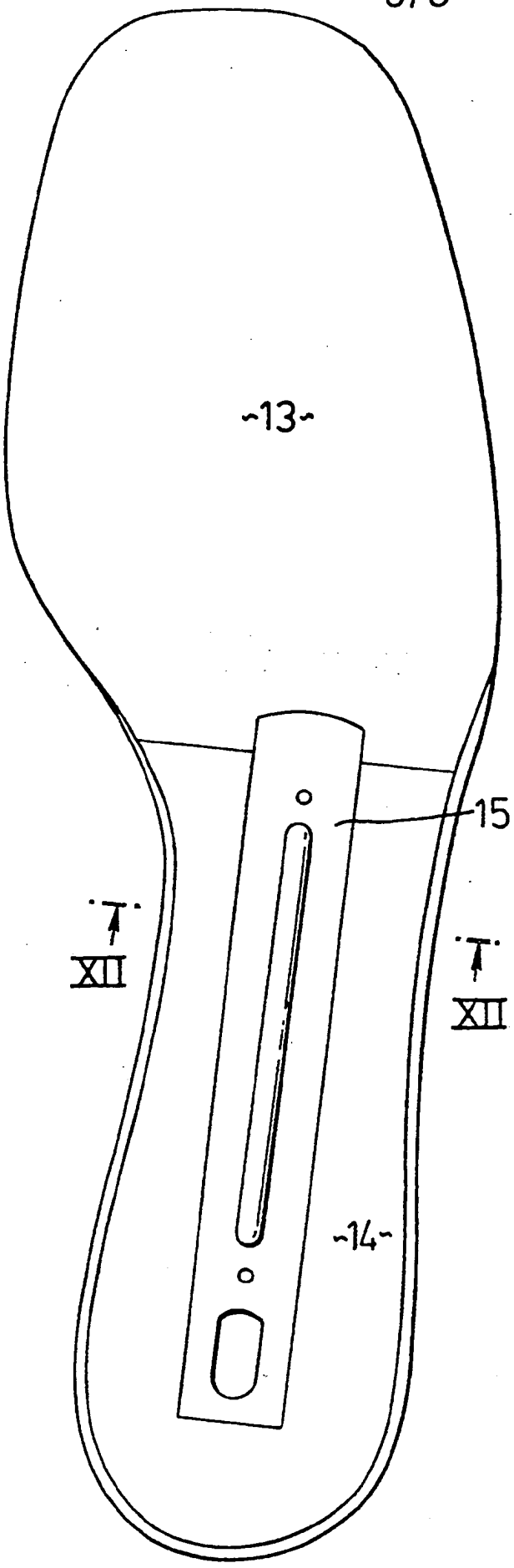

FIG. 11

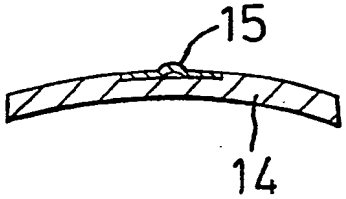

FIG. 12

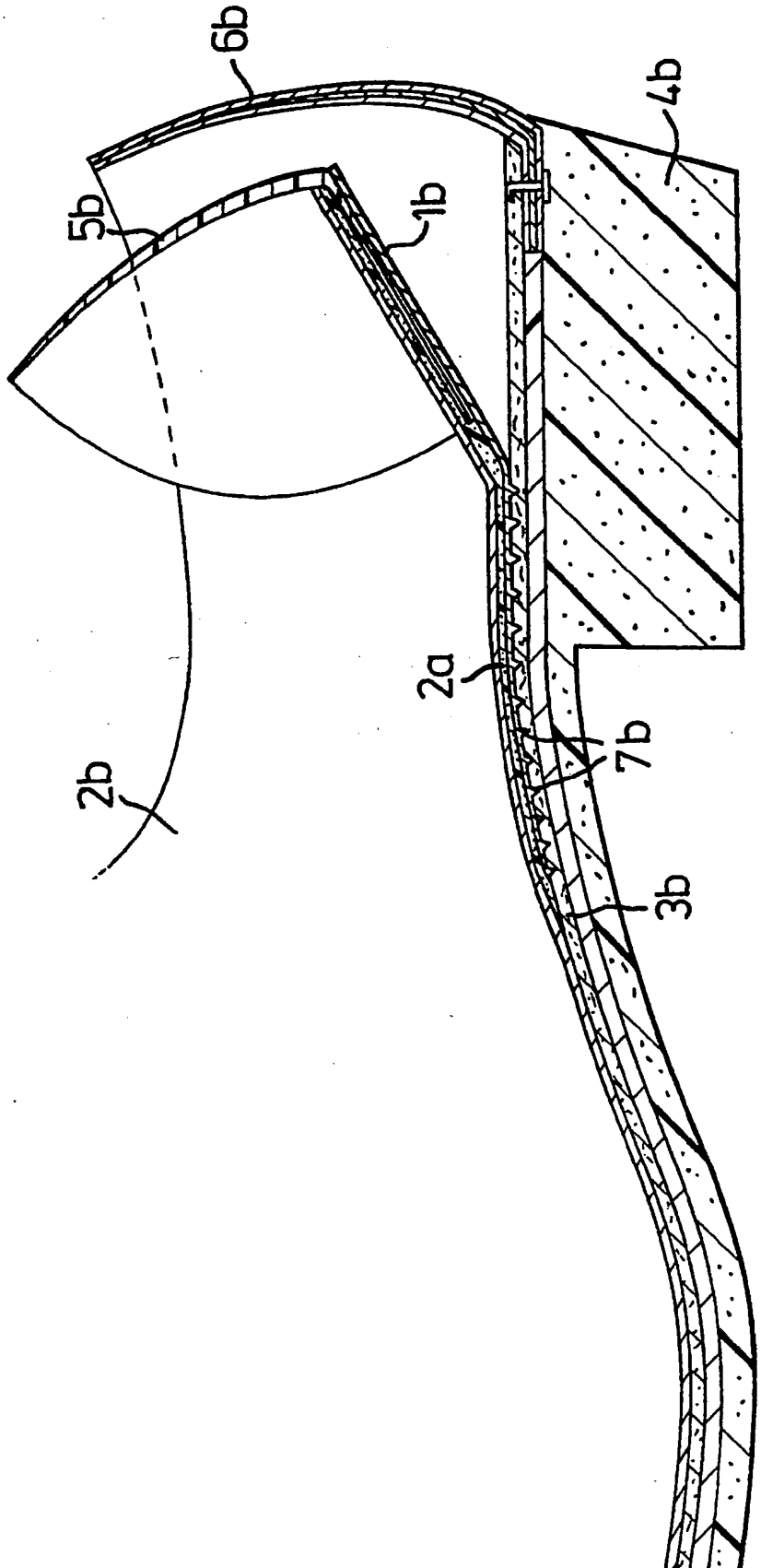

FIG. 14

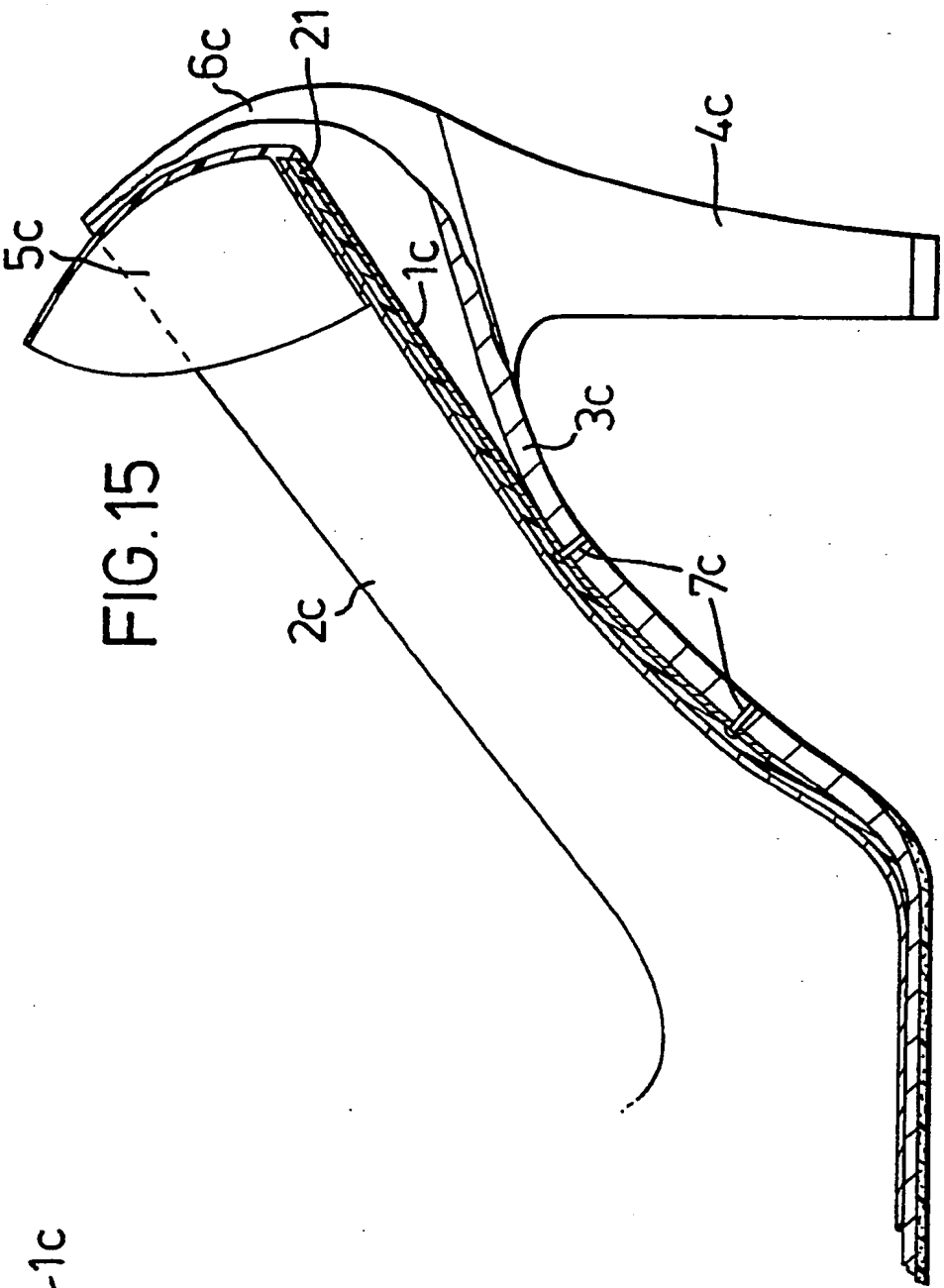

FIG.15

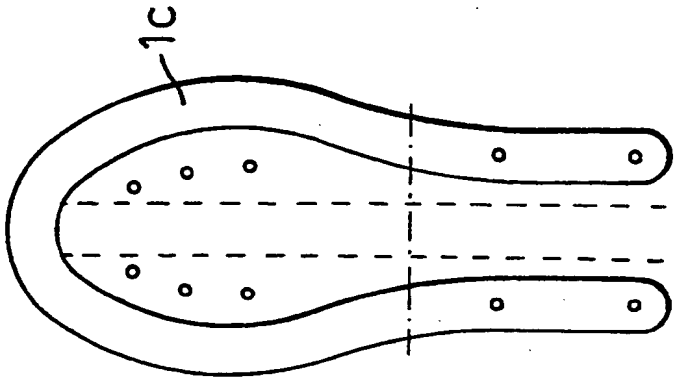

FIG.16

SPECIFICATION

A raised heel device for footwear

This invention relates to footwear, its object being to provide a device which can be incorporated *ab initio* in the footwear, or which can be added subsequently to ready-made footwear, which serves *inter alia* in the manner of a shoe-horn for facilitating placing of the footwear on the foot, and which may also serve to guide the heel of the foot into the heel portion of the footwear, and to support and the heel portion of the footwear against being accidentally trodden down or becoming laterally misaligned with respect to the remainder of the footwear.

According to a first aspect of the invention, there is provided a raised heel device for footwear comprising a resiliently deformable element having a forward portion and a rearward portion, the forward portion being adapted to be secured to the structure of the footwear with the rearward portion disposed (when unconstrained) at an angle inclined upwardly towards the rear end of the footwear, and a heel grip secured to the rearward portion for movement therewith.

According to a second aspect of the present invention, there is provided an item of footwear incorporating a raised heel device, said device comprising a resiliently deformable element having a forward portion and a rearward portion, the forward portion being secured to the structure of the footwear and the rearward portion being disposed (when unconstrained) at an angle inclined upwardly towards the rear end of the footwear, and a heel grip secured to the rearward portion for movement therewith.

In a first form of construction, the resiliently deformable element has its forward portion incorporated into the structure of the footwear, and may for instance pass at an angle forwardly and downwardly through an insole and into a heel block of the footwear. With such a construction, the angle of entry of the forward portion may correspond to the angle of upward inclination of the rearward portion, so that the element as a whole may be plane. In a preferred arrangement, the position of resilient bending of the element, when the rearward portion is pushed downwardly by a wearer's heel, is at a transverse line substantially where the element emerges from the footwear structure. At or adjacent to this line there may be provided a transverse fulcrum, for example an elongate member, such as a rod or wire, extending transversely of the usual insole and positioned on or in the insole, beneath the resiliently deformable element.

To assist in retaining the forward portion at the desired angle, even when the element as a whole is under maximum loading, there may be provided strut means extending between the insole and the forward portion. Conveniently, said strut means comprises one or more spikes of, for example, steel, an insole of the footwear and secured thereto in any convenient manner. By way of example, the forward portion may be secured to the insole by one or more fasteners such as spikes or rivets and/or by means of an adhesive or bonding agent. With such a construction, usually it will be necessary for the resiliently deformable element itself to be formed with an angle between the forward portion and the rearward portion such that, when the forward portion is secured in position on the insole, the rearward portion is tilted upwardly at the desired angle. Preferably the forward portion is somewhat elongate to ensure secure fixing.

With both forms of construction, the resiliently deformable element advantageously is in the form of a generally U-shape having the two limbs of the "U" pointing forwardly of the footwear, whereby the free end portions of the limbs constitute the forward portion of said element. Further the heel grip advantageously is in the form of a partial cup shaped to embrace the rear and sides of a wearer's heel. Conveniently, said cup has an internal peripheral flange by which it is secured on the resiliently deformable element.

For comfort and neatness of appearance, a flexible interior liner may be disposed over the insole and the raised heel device.

The raised heel device of the invention can be fitted to any type of footwear, for example children's women's, men's and sports shoes. The footwear can be laced, buckled, equipped with elastic insole or may be zipped boots.

In order that the nature of the invention may be readily acertained, non-limiting embodiments in accordance therewith are hereinafter particularly described with reference to the figures of the accompanying drawings. In the drawings:-

Figure 1 is a central vertical longitudinal section through a first embodiment, in which the raised heel device is incorporated *ab initio* in a shoe structure;

Figure 2 is a perspective view of a resiliently deformable spring steel element of the embodiment of Figure 1;

Figure 3 is a perspective view of a heel grip of the embodiment of Figure 1;

Figure 4 shows at (a) a part plan view, at (b) a part horizontal section, and at (c) a part vertical section of the heel grip of Figure 3;

Figure 5 shows at (a) an end elevation and at (b) a longitudinal axial section of a steel strut of the embodiment of Figure 1;

Figure 6 is a perspective view of a heel underlay of the embodiment of Figure 1;

Figure 7 is a perspective view of an assembly of the heel grip, spring steel frame element, and steel struts of the embodiment of Figure 1;

Figure 8 is a perspective elevation of an alternative form of steel strut suitable for use in the embodiment of Figure 1;

Figure 9 is a plan view, of an insole suitable for use in the embodiment of Figure 1;

Figure 10 is a section in the line X - X of Figure 9;

11;

Figure 13 is a side elevation, with parts in section of annassembly of spring heel grip with a "two-part" insole;

Figure 14 is a central vertical longitudinal section through another embodiment in which a raised heel device is applied subsequently to an existing shoe;

Figure 15 is a central vertical section through a further embodiment in which a raised heel device is applied subsequently to an existing shoe; and

Figure 16 is a plan view of a resiliently deformable spring steel element of the embodiment of Figure 15.

Referring to Figures 1 to 7, a raised heel device of the invention comprising a generally U-shaped spring steel element 1 having both limbs thereof embedded through an insole 2 of a shoe 3 into a heel block 4 thereof. On the freely moving part of the element 1 there is fixed a heel grip 5 which may have a shape identical with the back part of the shoemakers last used for making the shoe 3.

The function of the frame 1 is to keep the attached heel grip 5 in a desired position as described below in which the unconstrained heel grip is lifted from the insole 2 to facilitate the putting on of the shoe 3. The frame 1 is made of a 0.5-0.8 mm thick rustproof steel spring plate of sufficient flexibility to return to its original shape after application of substantial pressure (30-90Kg) and despite a 30° bend. The shape corresponds with the heel part of the last with a slight narrowing at the crossing of the insole, and the width may be for example, 12-14 mm depending on the width of the last.

The function of the heel grip 5 is to facilitate the putting on of the shoe and to protect the shoe sides and the shoe heel grip 6 from wearing down. The stiffness and shape retaining quality of the heel grip 5 protects the sole from losing shape and thus ensures that the median line of the shoe heel grip 6 will correspond with the supporting line of the wearer's foot even after long wear. The heel grip 5 is made of a pourable and colourable synthetic plastics material which can be mass-produced and has a leather-like stiffness and elasticity, is waterproof, but is selected not to set soft or lose its shape. Its shape corresponds exactly with that of the back part of the last, so as to fit into the shoe 2 without interfering with its production. It is preferable that the upper edge of the heel grip 5 is tapered to avoid pinching the foot. In Figure 4 there is shown the gradual tapering of the material towards the edges, and the ratio to the thicker and stiffer part. The height of the heel grip 5 is lower than that of the sides of the shoe 2, to facilitate a smooth transition between the heel grip and the shoe and to eliminate pinching of the foot.

A preferred manner of forming the heel grip 5 is to pour a heat-softenable synthetic plastics substance into a mould where the heel grip can be fixed directly onto the deformable frame 1 by using specially adapted tools. The same equipment may be used for the preparation of three adjoining sizes without losing the required accuracy; e.g. in women's shoes English sizes 4, 4½, and 5.

An angle of 30° between the spring frame 1 and the insole 3 is maintained by a pair of steel spikes 7 (see especially Figures 5 and 7) upstanding from the free ends of the limbs of the frame. These spikes 7 facilitate fixing both limbs of the frame 1 and sustain its flexibility, and secure the frame until its final fixing into the heel block 4. The spikes 7 are made of a non-oxidising iron or steel and consist of a cylindrical pointed steel spike (which penetrates into the lower half of the insole 3) with a flange at, for example, 2 mm distance from the tip to limit penetration into the insole. The length of the steel spike is determined by the last (size, length of heel, etc.,) and can be calculated by the equation

$$a = \text{sine } 30 \times b$$

where *a* is the length of the steel spike 7 and *b* is the length of the frame limb penetrating the insole 3. For example, if b = 25 mm, then:-

$$a = 0.5 \times 25 = 12.5 \text{ mm.}$$

The steel spikes 7 are fastened to both limbs of the spring frame 1 by riveting or spot welding. The measurements should be accurate because the spike should be at the right place according to its length, and the medial line of the steel frame and that of the spike should be positioned at 60° to give a 30° angle between the unconstrained frame 1 and the insole 3. An alternative form of spike 7*a* is shown in Figure 8 and has the shape of an inverted elongate frustocone from the upper end of which a central point protrudes to embed in the insole.

A transversely extending length of rustproof steel wire 8 acts as a fulcrum on which the free part of the steel frame 1 bends to 30°. The wire 8 secures a fixed position for the bending ends of the steel frame 1 by sinking into the footside of the insole 3, and prevents the insole from being damaged by the steel frame during wear.

A heel underlay 9 (see especially Figure 6) covers the uneven surface of the heel grip 5 and supporting frame portion, as in traditional shoes, and gives a comfortable position to the heelbone. The underlay 9 is made of a 2-3 mm thick textile or soft, foam synthetic plastics material, and has a shape which corresponds with that of the free part of the steel frame 1.

The insole 3 can be a conventional insole as shown in Figures 9 and 10 in which the total surface area is covered by an approximate 2-3 mm thick leather or imitation leather (with fiber or cellulose base) layer 10 onto which an approximate 3-3.5 mm thick flank reinforcing plate 11 is glued. Between these two layers 10, 11 is sandwiched a 12-15 mm wide flank stiffener 12 secured in place by claws, rivets or glue. Alternatively, the insole 3 can be a two-part insole as shown in Figures 11 and 12 in which a front part 13 consists of a flexible leather or synthetic leather covering about 40% of the full length of the insole 14 to which the flank reinforcing plate 15 is secured. A notch is sunk into the insole to

receive the reinforcing plate 15 and said plate is secured by riveting. This method results in the use of less material and a thinner insole, but having reduced flexibility at the flanks. The insole 3 can also be, for example, a poured insole (not shown) in which a cellulose insole is split at the flanks and a reinforcing thermoplastic synthetic material is poured into it. This method results not only in great accuracy, but also tightness and lightness because of the lack of a steel plate reinforcement.

The limbs of the frame 1 are located through slots cut at 30° into the respective sides of the insole 3 with a knife thinner than the steel frame 1. Before inserting the limbs through the slots, notches locating the pivot wire 8 are sunk into the sides the insole in line with the penetration of the steel frame. When the frame 1 is first inserted into the slots in the insole, it is provisionally secured by impression of the tip of the spikes 7 in the insole. The position can later be adjusted by marking a few main measurements (e.g. free bending length, etc.) during the preparation of the frame.

The frame 1 of the raised heel device can be secured into the shoe 2 by the so-called chemical sole fastening technique which has many advantages over the mechanical procedures, e.g.:

- the strength of fastening does not depend on the thickness of materials used (sole and insole);
- the resulting footwear is light and flexible because the layer of adhesive material does not stiffen the base structure;
- the resulting footwear is waterproof and insulated;
- it requires less labour and gives higher productivity; and
- it requires simpler and standardizable machinery.

There are three methods of chemical sole fastening, namely sole fastening with adhesive, vulcanized sole fastening and direct sole pouring. All three methods consist of the same stages, namely preparation, sole fastening, and finalising or dressing.

The preparatory stages of chemical sole fastening are identical with those of other well-known shoe-manufacturing methods and consist of roughing the sole, placing the sole, dusting, glueing, and drying the glue surfaces.

About 80 - 85% of all footwear is produced by fastening the upper and lower parts of the sole with adhesive. Usually, the soles are "layered" (i.e. the heel is fastened separately to the sole) or "moulded" (i.e. the heelback and the sole are in one piece). Layered soles are used especially in high-heeled women's shoes. In moulded soles the materials can be rubber or synthetic materials and the mould should provided space for the spring frame 1. The active glued surface are placed together according to the contours of the last. The active state of the glued surfaces can be mainted by adequate heat in the case of warm glueing and by finishing the operation within the necessary time limit in the case of cold gluing. The surfaces are pressed together in a [illegible] rubber, air or oil filled

directly vulcanized to a roughened and glued upper part on the last at 25-60 $\times 10^5$ Pa pressure, at 110-190°C. Due to the netlike structure of vulcanized rubber a very strong adhesion develops between the leather or textile fibres and the vulcanized part. The ends of the steel frame 1 are fastened into the rubber mixture and the procedure does not require special vulcanizing equipment because the frame limb ends in the open heel cavity.

In sole fastening by the direct "pouring" method a thermoplastic material is liquidified and poured into a closed mould under great pressure. After cooling, the rigid form is removed from the mould. This method can be used for making beach sandals, sandals, boots etc., and parts of footwear (sole, heel, etc.). In the latter case, the material is poured directly on the upper part of the sole fixed to the last. Suitable material for use in this method include thermoplastic substances such as PVC and thermoplastics; synthetic pastes such as plastisols; rubber; and polyurethanes. In this method, the spring frame 1 is secured as before by a spike 7 or 7*a* because the material poured under pressure into the heel block cavity firmly surrounds everything in it.

The raised heel device can be secured in footwear using other suitable techniques, but generally these require more careful preparations.

One of the main functions of the raised heel device of the invention is that the heel grip should firmly enclose the heel and its median line should correspond with the supporting line of the foot to preserve healthy bone structure and nervous system of the foot, or correct already existing slight deformations and damage. The major static deformations intended to be prevented or corrected by the device are fallen arches (*pes valgus*), flatfoot (*pes planovalgus* and *pes planus*). In order to prevent or correct such deformations, it is important that the last should be well shaped according to the requirements of the feet and that the shoe should keep its shape even after long wear and when the heel grip is not trodden on. The device of the invention can prevent foot deformities or correct already existing slight deformities because the deformable frame and the thickness of the heel grip raise the level of the insole and, therefore, the heel bone is well accommodated. Also the heel grip relieves the pressure from the heel of the shoe and prevents its deformation keeping its median line in line with the supporting line of the leg during the useful life of the shoe.

The raised heel device of the invention can also provide easier putting on of the shoe, protection of the sides and heel grip of the shoe, and keeping the aesthetic aspects of the shoe intact without the aid of any outside device (shoehorn). In particular, the spring heel grip eliminates the worn-out aspect which is so common especially in men's shoes because the emergence of the device at the removal of the shoe facilitates its putting on without any additional device and the device by replacing itself without any extra force coaxes the foot into the shoe

longer wear and tear of the shoe due to the lack of damage to the heel.

The raised heel device of the invention also can reduce production cost of the last without shortening its useful life. In industrial production, the shaping of the shoe heel is carried out automatically on a machine which also irons and secures the heel, top leather and lining to the inner sole with 12-20 tacks. In the traditional manufacturing method, the tips of the tacks holding the heel are bent back on the iron part of the last. When a device of the invention is used, the iron part of the last can become superflous because the tips of the tacks can be bent back by the deformable frame. For example, in the production of six million pairs of shoes about thirty thousand pairs of lasts are required. If the heels of the lasts are not provided with an iron part, the savings are about 20 pence per pair which represents an overall saving of about £6,000.

As shown in Figures 14 to 16, the raised heel device of the invention also can be easily secured into ready made footwear. In these Figures, the same reference numerals are used as in Figure 1 to identify similar parts of the shoe and raised heel device but with the addition of *b* (Figure 14) or *c* (Figures 15 and 16).

The arrangement shown in Figure 14 differs from that of Figure 1 in that the shoe 2*b* is already formed and the frame 1*b* is secured to the insole 3*b* by a plurality of depending spikes 7*b* of, for example, 2 mm length at 5-6 mm spacing. The rearward portion of the frame 1*b* is bent upwardly from the forward portion to provide the upward 30° elevation of the heel grip 5*b*. Suitably, the forward portion of the frame 1 is covered by a small cushion 2*a*.

The arrangement shown in Figure 15 and 16 differs from that shown in Figure 13 in that the frame 1*c* is essentially plane and is secured to the insole 3*c* by rivets 7*c*. Further, the cushion 20 is replaced by a polyurethane layer 21 of about 1 mm thick artificial leather fibre which extends to the base of the heel grip 5*c*.

Since the heel grip part of a shoe does not change much according to fashion, the shaping of the raised heel device is not difficult and essentially only the size of the shoe and the height of the heel need be taken into consideration. It is possible, therefore, to provide a well shaped raised heel device for many different types of shoe without the wearer being aware of the face that this part is not specially made for each pair of shoes. The length of the rearward portion of the raised heel devices shown in Figures 14, 15 and 16 is the same as that of the previous Figures but the forward portion is longer in order to provide the required stability of the device.

It is recommended that the forward portion should be covered by some self adhesive substance covered by a protective sheet which can be removed just before fixing. Before fitting the device, the insole should be carefully lifted up and when the device is in place the insole should be reglued without creasing.

It will be appreciated that this invention is not restricted to the particular details described above with reference to the drawings but that numerous modifications and variations can be made without departing from the scope of the invention as defined in the following claims.

CLAIMS

1. A resiliently deformable element having a forward portion and a rearward portion, the forward portion being adapted to be secured to the structure of the footwear with the rearward portion disposed (when unconstrained) at an angle inclined upwardly towards the rear end of the footwear, and a heel grip secured to the rearward portion for movement therewith.

2. An item of footwear incorporating a raised heel device, said device comprising a resiliently deformable element having a forward portion and a rearward portion, the forward portion being secured to the structure of the footwear and the rearward portion being disposed (when unconstrained) at an angle inclined upwardly towards the rear end of the footwear, and a heel grip secured to the rearward portion for movement therewith.

3. An item of footwear as claimed in Claim 2, wherein the forward portion of the raised heel device is incorporated into the structure of the footwear.

4. An item of footwear as claimed in Claim 3, wherein said forward portion passes at an angle forwardly and downwardly through an insole and into a heel block of the footwear.

5. An item of footwear as claimed in Claim 4, wherein the deformable element of the raised heel device (when unconstrained) is plane and the angle of entry of said forward portion corresponds to the angle of upward inclination of the rearward portion of said device.

6. An item of footwear as claimed in Claim 4 or Claim 5, wherein when the rearward portion of the raised heel device is pushed downwardly by a wearer's heel, the deformable element of said device bends along a transverse line substantially where said elements emerges from the footwear structure.

7. An item of footwear as claimed in Claim 6, wherein a transverse fulcrum is provided beneath said element out or adjacent said transverse line.

8. An item of footwear as claimed in Claim 7, wherein said fulcrum is provided by an elongate member extending transversely of the insole and positiond in or on the insole.

9. An item of footwear as claimed in any one of Claims 3 to 8, wherein strut means extend between the insole and said forward portion to restrain movement of said portion when the rearward portion of the raised heel device is pushed downwards by a wearer's heel.

10. An item of footwear as claimed in Claim 9, wherein said strut means comprises one or more spikes upstanding from said forward portion with the upper end(s) thereof embedded in the insole.

11. An item of footwear as claimed in Claim 2, wherein the forward portion of the raised heel device is positioned on and secured to an insole of the footwear.

12. An item of footwear as claimed in Claim 11, wherein said forward portion is secured to the insole

by one or more fasteners.

13. An item of footwear as claimed in Claim 11 or Claim 12, wherein said forward portion is secured to the insole by an adhesive or bonding agent.

14. An item of footwear as claimed in any one of Claims 11 to 13, wherein the deformable element of the raised heel device is formed with an angle between the forward and rearward portions.

15. An item of footwear as claimed in any one of Claims 2 to 14, wherein the deformable element of the raised heel device is of generally U-shape having the two limbs thereof pointing forwardly of the footwear whereby the free end portions of the limbs constitute the forward portion of the said element.

16. An item of footwear as claimed in any one of Claims 2 to 15, wherein the heel grip of the raised heel device is in the form of a partial cup shaped to embrace the rear and sides of a wearer's heel.

17. An item of footwear as claimed in Claim 16, wherein said cup has an internal peripheral flange by which it is secured on the deformable element of the raised heel device.

18. An item of footwear as claimed in Claim 2 and substantially as hereinbefore described with reference to Figure 1 to 12.

19. An item of footwear as claimed in Claim 2 and substantially as hereinbefore described with reference to Figure 13.

20. An item of footwear as claimed in Claim 2 and substantially as hereinbefore described with reference to Figure 14.

21. An item of footwear as claimed in Claim 2 and substantially as hereinbefore described with reference to Figure 15.

22. A raised heel device as claimed in Claim 1, wherein the deformable element of the raised heel device is of generally U-shape having the two limbs thereof pointing forwardly of the footwear whereby the free end portions of the limbs constitute the forward portion of the said element.

23. A raised heel device as claimed in Claim 1 or Claim 22, wherein the heel grip of the raised heel device is in the form of a partial cup shaped to embrace the rear and sides of the wearer's heel.

24. A raised heel device as claimed in Claim 23, wherein said cup has an internal peripheral flange by which it is secured on the deformable element of the raised heel device.

25. A raised heel device as claimed in Claim 1 and substantially as hereinbefore described with reference to Figures 1 to 12.

26. A raised heel device as claimed in Claim 1 and substantially as hereinbefore described with reference to Figure 13.

27. A raised heel device as claimed in Claim 1 and substantially as hereinbefore described with referene to Figure 14.

28. A raised heel device as claimed in Claim 1 and substantially as hereinbefore described with reference to Figures 15 and 16.

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